USGS
science for a changing world

# Columbia Environmental Research Center

## Introduction

***www.cerc.usgs.gov***

The Columbia Environmental Research Center (CERC) provides leadership and scientific information for the U.S. Geological Survey (USGS) by addressing national and international environmental contaminant issues, and assessing impacts of habitat alterations on aquatic and terrestrial ecosystems. This includes large-river floodplains, coastal habitats, wetlands, and lakes. As part of the Biological Resources Division, CERC fulfills its mission by maintaining partnerships with other scientific entities and with the Department of the Interior's natural resource management agencies.

## Scientific Focus Capabilities

*www.cerc.usgs.gov/Research/capabilities.htm*

The Columbia Environmental Research Center has nationally and internationally recognized scientific capabilities that are flexible to meet the changing needs of clients and the scientific community:

**Environmental Toxicology and Chemistry**
**Ecological Research**
**Ecogeography**
**Large-River Ecology**
**Information and Technology Transfer**

Scientists in seven CERC Field Research Stations across the United States conduct specialized toxicological and ecological studies in aquatic and terrestrial ecosystems.

To provide an integrated approach to complex resource problems, research projects are staffed with team members from the following branches:

**Toxicology**
**Environmental Chemistry**
**Ecology**
**Biochemistry and Physiology**
**Ecogeography**
**Field Station Research**
**Information Technology**

The Center conducts research; develops inventory and monitoring tools; and provides technical assistance, information, and technology transfer necessary to meet the goals of the USGS. The Columbia Environmental Research Center's focus on scientific capabilities provides the foundation for a broad framework to address current and emerging natural resource issues.

**4200 New Haven Road**
**Columbia, Missouri 65201**
**573-875-5399; 573-876-1896 (FAX)**

## Facilities

The heart of CERC is a 26,000-square foot building with a central wet laboratory. Specialized research buildings provide an additional 37,000-square feet devoted to aquatic toxicology, large river fish ecology, geographical information systems (GIS), aquacultures, environmental chemistry, contaminated sediment and hazardous chemical testing, computer facilities, library services, and conference facilities. Testing facilities are capable of formulating test waters that simulate conditions from acid-sensitive lakes to saline estuaries.

The Columbia Environmental Research Center is the only U.S. Geological Survey laboratory conducting biological research on highly toxic compounds. A hazard assessment laboratory enables investigations of chemicals that are too hazardous to test in a normal laboratory setting. This building also houses CERC's effluent treatment system.

Facilities are augmented by 32 small ponds that are used to investigate the intricate relationships among organisms in freshwater habitats. Three constructed streams are used to study communities in flowing waters. CERC uses two mobile laboratories for on-site evaluation of contaminants.

The Environmental Technology Center, completed in October 1995, is located at CERC. This facility houses the River Studies Station, GIS activities, hydrologic research, Internet/Intranet and audiovisual services, and CERC's Office of Outreach.

## Scientific Goals

*www.cerc.usgs.gov/Research/research.htm*

Scientists and staff at the Columbia Environmental Research Center provide credible, impartial scientific information to those who manage natural resources and make policy decisions. Interactions occur across organizational and geographical boundaries to maximize available skills, data, and scientific technology to ensure a multidisciplinary approach to scientific problem solving. Research emphasis is placed on USGS partnerships with other federal agencies, academia, state and local governments, nongovernmental organizations, and private industry. Together, CERC and its partners leverage their combined assets to produce the best possible scientific products. CERC's positive national image results from the high quality of its scientific products, coupled with the relevance of these products to problems identified by natural resource management agencies and the scientific community.

**Handling highly toxic chemicals used in CERC contaminant research requires special safety considerations. Scientists conduct the procedures in the hazard assessment laboratory using chemical fume hoods and safety clothing.**

**Missouri River side channels provide an opportunity for the river to reconnect with its flood plain. The side channel above was formed from recent floods in the Midwest, providing new habitat south of Glasgow, MO, in the Lisbon Bottoms Unit of the Big Muddy National Fish and Wildlife Refuge, U.S. Fish and Wildlife Service. This new, secondary channel is the focus of several CERC research projects.**

Missouri River InfoLINK

http://infolink.cr.usgs.gov/

A Clearinghouse of Missouri River Information

## River Studies Station

*www.cerc.cr.usgs.gov/rss/*

To improve scientific understanding of the ecological consequences of management actions on large-river ecosystems, CERC developed the River Studies Station, a multidisciplinary team of its scientists. Research emphasizes understanding how management changes in the physical and chemical conditions of a large river affect habitat and consequent biological responses.

A large-river ecosystem includes the channel, floodplain, and off-channel water bodies with hydrologic connections to the channel. Improved understanding of large-river ecosystems requires a comprehensive and multidisciplinary approach. The River Studies Station has expertise in biological, physical, and chemical river processes that can be used to address complex processes in large-river ecosystem functioning.

The River Studies Station provides ecosystem research results to support river-resource management decisions. In this role, the River Studies Station works closely with federal and state resource management agencies to identify critical scientific information needs.

While the scope of the River Studies Station includes rivers throughout the United States, the Missouri River offers a particular challenge for multiobjective, scientifically based management. The River Studies Station provides the various users of the Missouri River with quantitative, integrated scientific understanding of how management decisions are linked to environmental and ecological responses of the river.

### *Integrated River Ecology Studies on the Missouri River*

*http://infolink.cr.usgs.gov/science/habitats/*

The CERC River Studies Station develops methods to evaluate habitat changes over temporal scales ranging from centuries to individual floods and over spatial scales ranging from river segments to macrohabitats. Scientists use historical approaches to evaluate baseline conditions and long-term dynamics of the channel and floodplain. Monitoring and sampling approaches are used to assess short-term dynamics and habitat affinities at the scale of river reaches. Through hydraulic habitat modeling, spatial and temporal distributions of depth and velocity in the channel and floodplain are inventoried. By varying flow duration and channel-geometry characteristics in such models, the River Studies Station can evaluate alternative hydrographs and channel designs. The quantitative understanding of habitat availability provides a framework for biological sampling and telemetry studies to assess links between habitat and biotic responses.

## Interactions with Academia

CERC maintains strong ties with the academic community through adjunct appointments at several universities. In this capacity, CERC staff teach university courses, serve as guest lecturers, and serve on graduate student advisory committees.

A breadth of research activities is conducted in cooperation with universities across the United States and with other countries.

This high level of interaction benefits CERC scientists by creating collaborative research projects and benefits students of natural resource sciences by providing research opportunities in their scientific disciplines.

## Partners Co-Located at CERC

### Big Muddy National Wildlife Refuge

The Big Muddy National Fish and Wildlife Refuge headquarters is co-located at CERC. The Big Muddy was established in 1994 to preserve and restore the Missouri River floodplain, to manage fish and wildlife habitats, and to provide for compatible public use of river resources. CERC provides GIS, biologic, and hydrologic analyses for the Big Muddy NFWR including land cover maps; and conducts research on the side channel in the Lisbon Bottoms south of Glasgow, MO.

### Missouri Resource Assessment Partnership

MoRAP, co-located at CERC, partners with 10 government agencies and the University of Missouri. The role of MoRAP is to develop, analyze, and deliver high-quality information using remote sensing technologies to meet natural resource management goals for state and federal agencies. Aquatic GAP (Gap Analysis Program) is currently one of MoRAP's resource projects with CERC.

**Aquatic GAP is a partnership of organizations and agencies that deal with aquatic natural resource issues. Its goal is to characterize and map freshwater, estuarine, and marine species; communities, and their habitats on a landscape scale. One of the pilot projects is being done in Missouri.**

## For Further Information

**Center Director**: Bill Mauck; 573-876-1801; Bill_Mauck@usgs.gov

**Assistant Center Director**: Susan Jones; 573-876-1828; Susan_B_Jones@usgs.gov

**Administrative Officer**: Joe Henderson; 573-876-1805

**Outreach Coordinator**: Marcia Nelson; 573-876-1875

**River Studies Station**: Robert Jacobson; 573-876-1844

**Brazos Field Research Station**; College Station, TX; 409-862-2366--Don Clark

**International Falls Biological Station**; International Falls, MN; 218-283-9822--Larry Kallemeyn

**Jackson Field Research Station**; Jackson, WY; 307-733-2314 x14--Dan Woodward

**Marine Ecotoxicology Research Station**; Corpus Christi, TX; 512-980-3216--Scott Carr

**Padre Island Field Research Station**; Padre Island, TX; 361-949-8173 x228--Donna Shaver-Miller

**Texas Gulf Coast Field Research Station**; Corpus Christi, TX; 361-985-6266--Marc Woodin

**Yankton Field Research Station**; Yankton, SD; 605-665-9217--Steve Hamilton